GROUP 33

FRONT SUSPENSION

CONTENTS

WANINGS REGARDING SERVICING OF SUPPLEMENTAL RESTRAINT SYSTEM (SRS) EQUIPPED VEHICLES

⚠ WARNING

- ***Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and paassenger (from rendering the SRS inoperative).***
- ***Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.***
- ***MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.***

NOTE
The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

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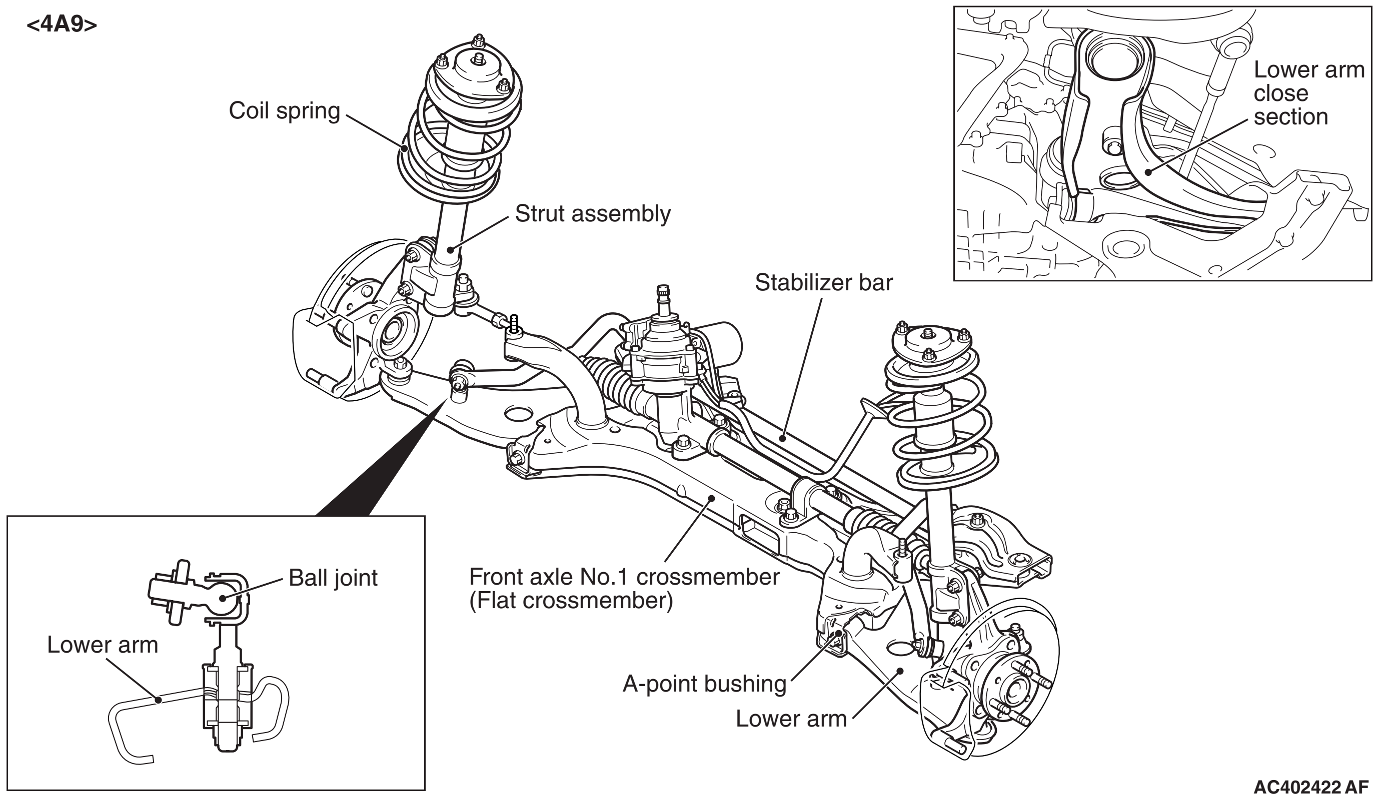
GENERAL INFORMATION

M1332000100764

The front suspension is a MacPherson strut with coil spring. The shock absorber is gas-filled hydraulic double-acting type.

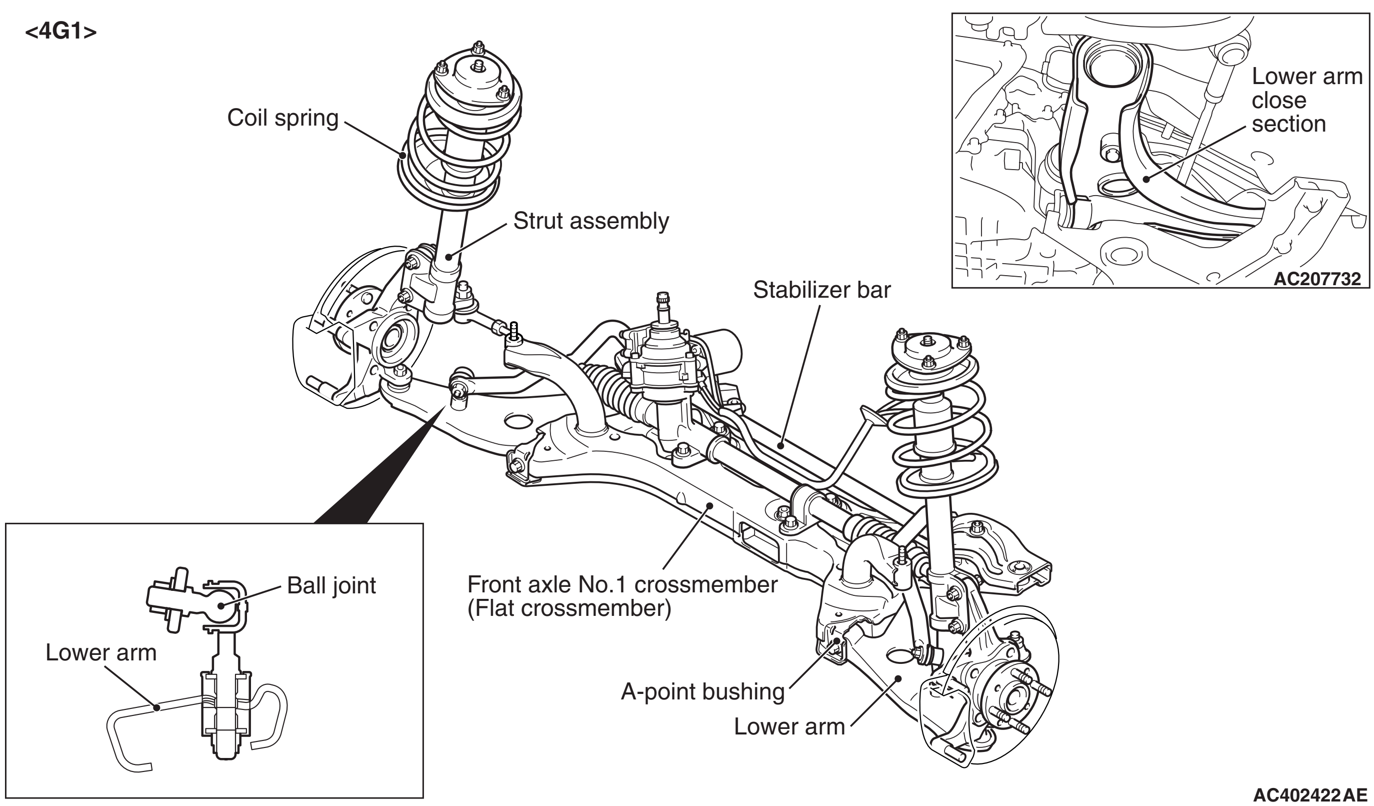
CONSTRUCTION DIAGRAM

<4A9>



AC402422 AF

<4G1>



AC402422 AE

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SPECIFICATIONS

COIL SPRING

<4A9>

Item		Specification
Wire diameter mm		12
Average outside diameter mm		133 – 149 – 154
Free length mm	CVT	331
	5MT	301

<4G1>

Item	Specification
Wire diameter mm	13
Average outside diameter mm	133 – 150 – 154
Free length mm	300

SERVICE SPECIFICATIONS

M1332000300898

Item			Standard value
Toe-in	At the centre of tyre tread mm		0 ± 2
	Toe-angle (per wheel)		0°00' ± 0°06'
Steering angle	Inner wheel	Vehicles with 14-inch wheels	41°40' ± 1°30'
		Vehicles with 15-inch wheels	39°00' ± 1°30'
		Vehicles with 16-inch wheels	34°10' ± 1°30'
	Outer wheel <reference>	Vehicles with 14-inch wheels	35°30'
		Vehicles with 15-inch wheels	33°40'
		Vehicles with 16-inch wheels	30°00'
Camber	4A9		– 0°30' ± 0°30' *
	4G1		– 0°30' ± 0°45' *
Caster	4A9		2°35' ± 0°30' *
	4G1		2°40' ± 0°45' *
Kingpin inclination			13°20' ± 0°30'
Lower arm ball joint starting torque N·m			0 – 3.9
Protruding length of stabilizer link thread part mm <4A9>			19 ± 1.5
Protruding length of stabilizer link assembly mm <4G1>			5.0 ± 1.5

*NOTE: *: Difference between right and left wheels must be less than 30'*

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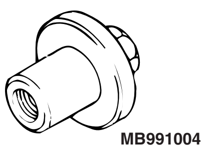
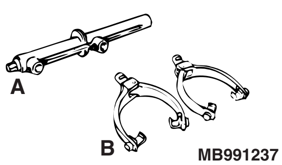
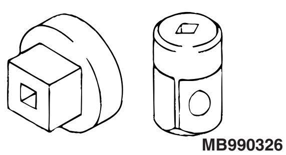
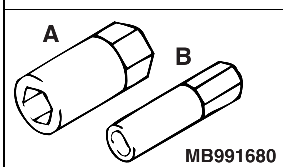
LUBRICANT

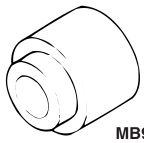
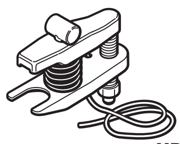
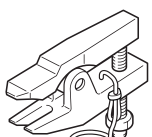
M1332000400378

Item		Specified lubricant	Quantity
Bump rubber	Contact surface between the bump rubber and the spring upper seat	Multipurpose grease SAE J310, NLGI No.2 or equivalent	As required
Lower arm ball joint <4A9>	Inside of dust cover		Inside of dust cover : 9.0 ± 0.5 g
	Lip portion of dust cover		Lip portion of dust cover : 1.0 ± 0.5 g

SPECIAL TOOLS

M1332000600651

Tool	Number	Name	Use
	MB991004	Wheel alignment gauge attachment	Wheel alignment measurement <Vehicles with aluminium wheels>
	A: MB991237 B: MB991238	A: Spring compressor body B: Arm set, large	Coil spring compression
	MB990326	Preload socket	Lower arm ball joint starting torque check
	MB991680 A: MB991681 B: MB991682	Wrench and socket set A: Wrench B: Socket	Strut assembly disassembly and reassembly

Tool	Number	Name	Use
 MB990800	MB990800	Ball joint remover and installer	Lower arm ball joint cover installation
 MB991897	MB991897 or MB992011	Ball joint remover	Knuckle and ball joint disconnection <4A9> *NOTE: Steering linkage puller (MB990635 or MB991113)is also used to disconnect knuckle and tie rod end ball joint.*
 B991113	MB991113	Steering linkage puller	Knuckle and ball joint disconnection <4G1>

ON-VEHICLE SERVICE

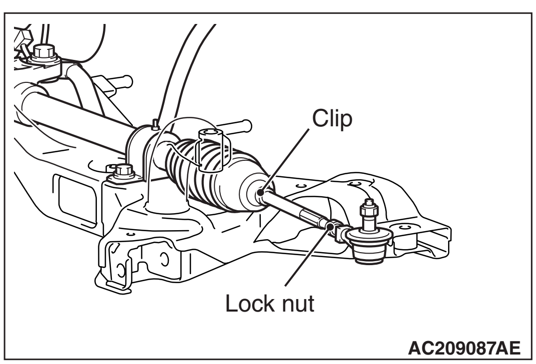
FRONT WHEEL ALIGNMENT CHECK AND ADJUSTMENT

M1331000901050

Measure wheel alignment with alignment equipment on a level surface. The front suspension, steering system, wheels, and tyres should be serviced to normal condition before measuring wheel alignment.

TOE-IN

Standard value:
At the centre of tyre tread: 0 ± 2 mm
Toe angle (per wheel): 0°00' ± 0°06'



AC209087AE

1. Adjust the toe-in by undoing the clip and lock nut, and turning the left and right tie rod turnbuckles by the same amount (in opposite directions).

NOTE: The toe will move out as the left turnbuckle is turned toward the front of the vehicle and the right turnbuckle is turned toward the rear of the vehicle.

2. Install the clip and tighten the lock nut to the specified torque.

Tightening torque: 43 ± 7 N·m

3. Confirm that the toe-in is at the standard value.
4. Use a turning radius gauge to check that the steering angle is at the standard value.

STEERING ANGLE
Standard value:

Inner wheels	Vehicles with 14-inch wheels	41° 40' ± 1° 30'
	Vehicles with 15-inch wheels	39° 00' ± 1° 30'
	Vehicles with 16-inch wheels	34° 10' ± 1° 30'
Outer wheels (reference)	Vehicles with 14-inch wheels	35° 30'
	Vehicles with 15-inch wheels	33° 40'
	Vehicles with 16-inch wheels	30° 00'

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CAMBER, CASTER AND KINGPIN INCLINATION

Standard value:

Item		Specification
Camber	<4A9>	– 0°30' ± 0°30'*
	<4G1>	– 0°30' ± 0°45'*
Caster	<4A9>	2°35' ± 0°30'*
	<4G1>	2°40' ± 0°45'*
Kingpin inclination		13°20' ± 0°30'

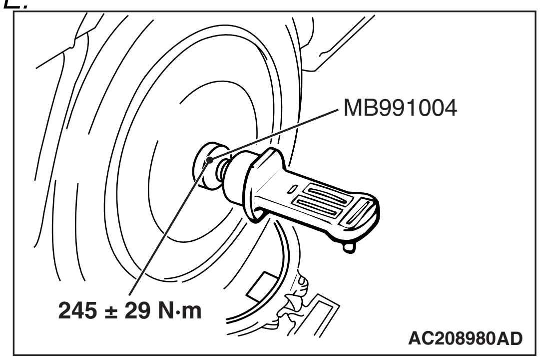
*NOTE: *: Difference between right and left wheels must be less than 30'*

NOTE: Camber and caster are preset at the factory and cannot be adjusted.

⚠ CAUTION

Never subject the wheel bearings to the vehicle load when the driveshaft nuts are loosened.

NOTE:



For vehicles with aluminium wheels, attach the camber/caster/kingpin gauge to the driveshaft by using special tool wheel alignment gauge attachment (MB991004). Tighten the special tool to the same torque 245 ± 29 N·m as the driveshaft nut.

LOWER ARM BALL JOINT AXIAL PLAY CHECK

M1332011300074

1. Raise the vehicle.
2. Remove the stabilizer link from the lower arm.
3. Move the lower arm up and down with your hands to check for an excessive play in the axial direction of the ball joint. If there is an excessive play, replace the lower arm assembly.

LOWER ARM BALL JOINT COVER CHECK

M1332008600321

1. Press the lower arm ball joint cover with your finger to check that there are no cracks or damage in the lower arm ball joint cover.
2. If the lower arm ball joint cover is cracked or damaged, replace the lower arm assembly.

   NOTE: If the lower arm ball joint cover is cracked or damaged, it is possible that there may also be damage to the ball joint.

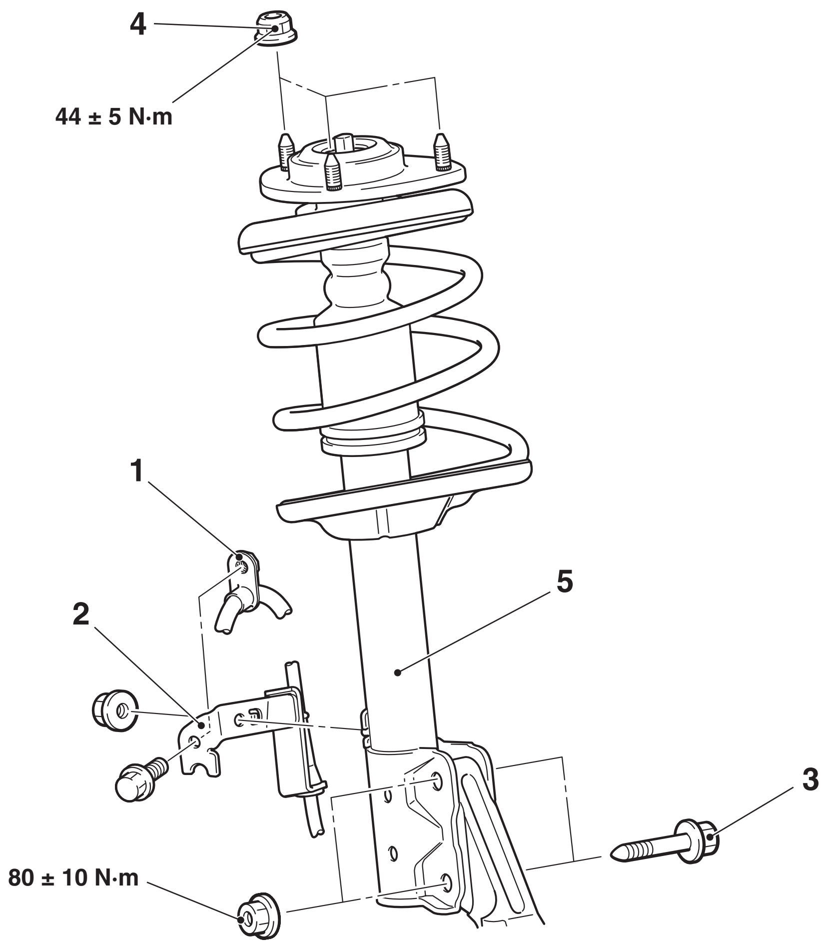
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STRUT ASSEMBLY

REMOVAL AND INSTALLATION

M1332001100488

Pre-removal Operation	Post-installation Operation
Cowl top panel (Refer to GROUP 42, Loose panel P.42-81).	• Cowl top panel (Refer to GROUP 42, Loose panel P.42-81). • Front wheel alignment check and adjustment (Refer to P.33-5).



Removal steps

1. Brake hose bracket
2. Front wheel speed sensor harness bracket
3. Knuckle connection
4. Strut nut (self-locking nut)
5. Strut assembly

INSPECTION

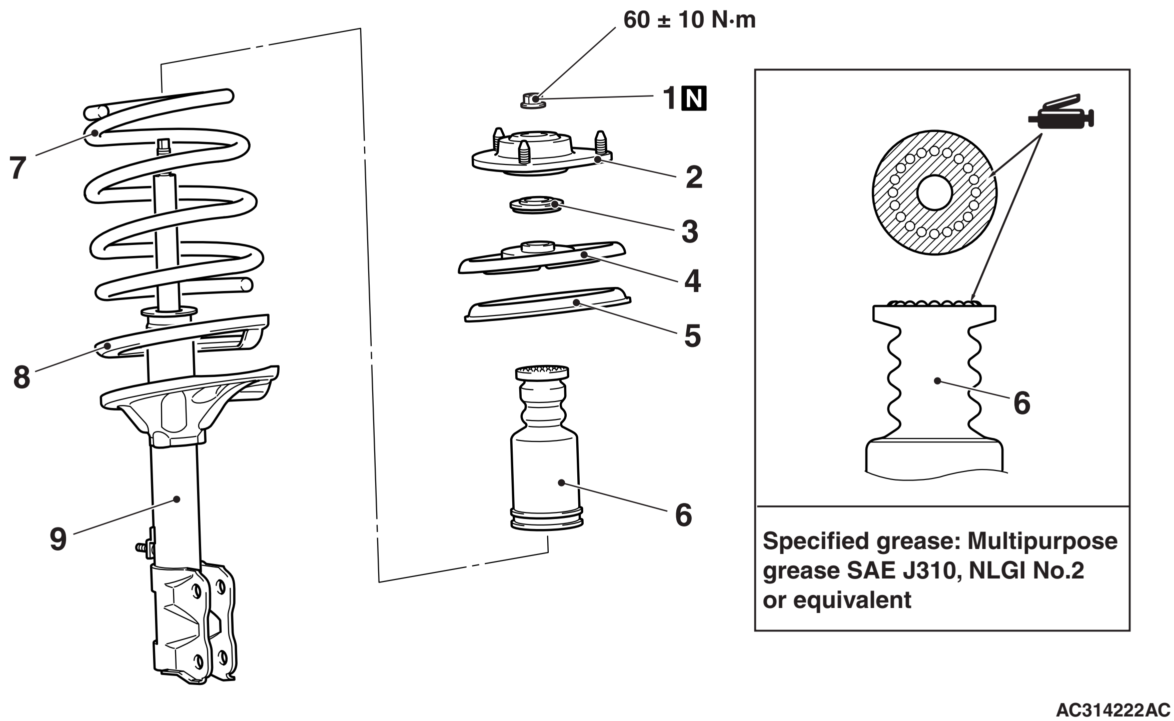
M1332001200247

- Check for oil leaks from the strut assembly.
- Check the strut assembly for damage or deformation.

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DISASSEMBLY AND REASSEMBLY

M1332001300482



Disassembly steps

<<**A**>>>>**A**<< 1. Strut nut (self-locking nut)
2. Strut insulator
3. Strut bearing
4. Spring upper seat
5. Spring upper pad

Disassembly steps (Continued)

6. Bump rubber
7. Coil spring
8. Spring lower pad

<<**B**>> 9. Strut

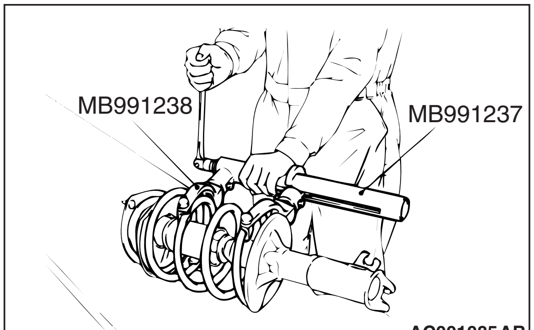
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DISASSEMBLY SERVICE POINTS

<<A>> STRUT NUT (SELF-LOCKING NUT) REMOVAL

⚠ CAUTION

- **Install special tool arm set (MB991238) evenly, and so that the maximum length will be attained within the installation range.**
- **Do not use an impact wrench to tighten the bolt of special tool spring compressor body (MB991237), otherwise the special tool will break.**

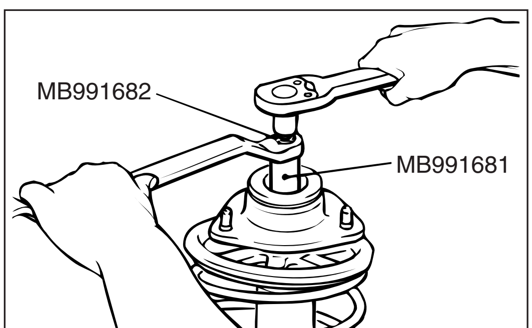


AC001085AB

1. Use following special tools to compress the coil spring.
- Spring compressor body (MB991237)
- Arm set (MB991238)

⚠ *WARNING*

Do not use an impact wrench to remove the strut nut (self-locking nut). Vibration of the impact wrench will cause special tools (MB991237 and MB991238) to slip and cause personal injury.



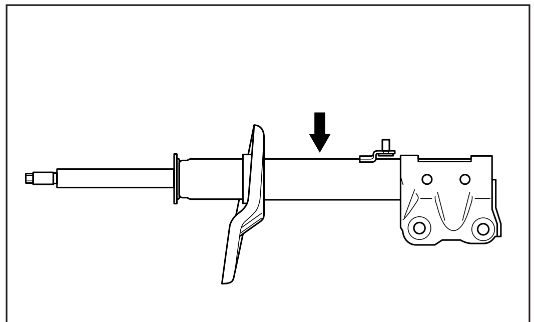
AC006091AB

2. Use following special tools to secure the strut, and then remove the strut nut (self-locking nut).
- Wrench (MB991681)
- Socket (MB991682)

<<B>> STRUT DISPOSAL

⚠ *WARNING*

Wear goggles when drilling to protect your eyes from flying metal debris.


AC207801AC

The gas must be discharged from the strut before discarding it. Place the strut horizontally with its piston rod extended. Then drill a hole of approximately 3 mm in diameter at the location shown in the illustration and discharge the gas.

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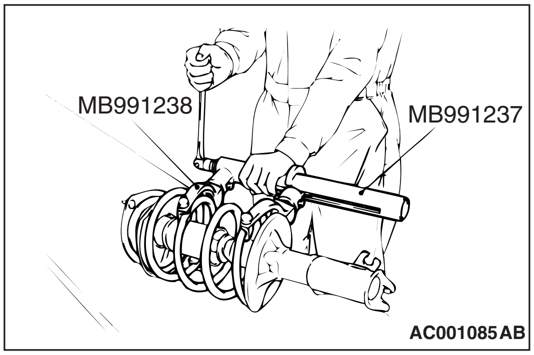
REASSEMBLY SERVICE POINTS

>>A<< STRUT NUT (SELF-LOCKING NUT) INSTALLATION

1. Ensure that the bearing is seated correctly.

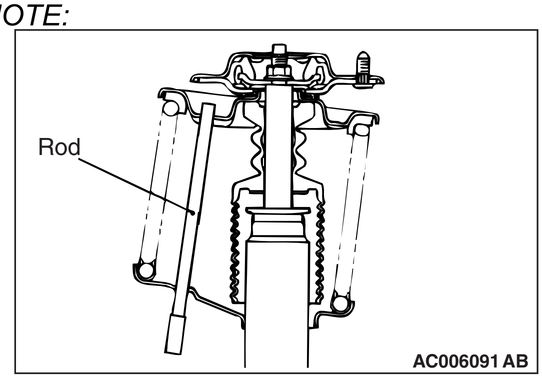
⚠ CAUTION

Do not use an impact wrench to tighten the bolt of special tool spring compressor body (MB991237), otherwise the special tool will break.



2. Install following special tools to the strut assembly same as its removal.
   - Spring compressor body (MB991237)
   - Arm set (MB991238)
3. While the coil spring is being compressed by the special tools, temporarily tighten the strut nut (self-locking nut).
4. Align the hole in the strut spring lower seat with the hole in the spring upper seat.

   NOTE:

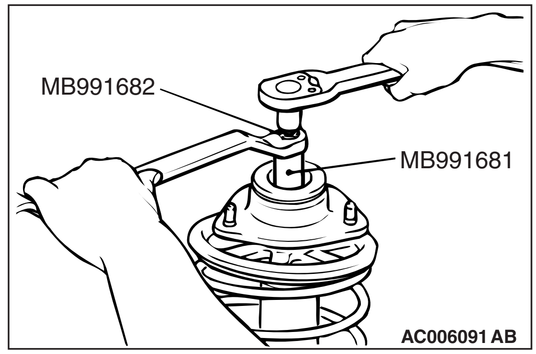


   Using a rod as shown facilitates the alignment.

5. Align lower end of the coil spring with the groove in the spring lower seat, and then loosen the special tools.

⚠ CAUTION

Do not use an impact wrench to tighten the self-locking nut, otherwise the strut nut (self-locking nut) will be damaged.



6. Using following special tools, tighten the strut nut (self-locking nut) to 60 ± 10 N·m.
   - Wrench (MB991681)
   - Socket (MB991682)

INSPECTION

M1332001400188

- Check the strut bearing for wear or rust.
- Check the rubber parts for damage or deterioration.
- Check the coil spring for deformation, deterioration or damage.
- Check the strut for deformation.

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LOWER ARM

REMOVAL AND INSTALLATION <4A9>

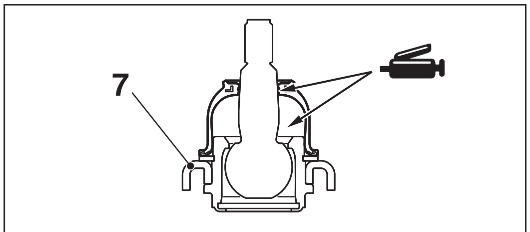
M1332001600911

⚠ CAUTION

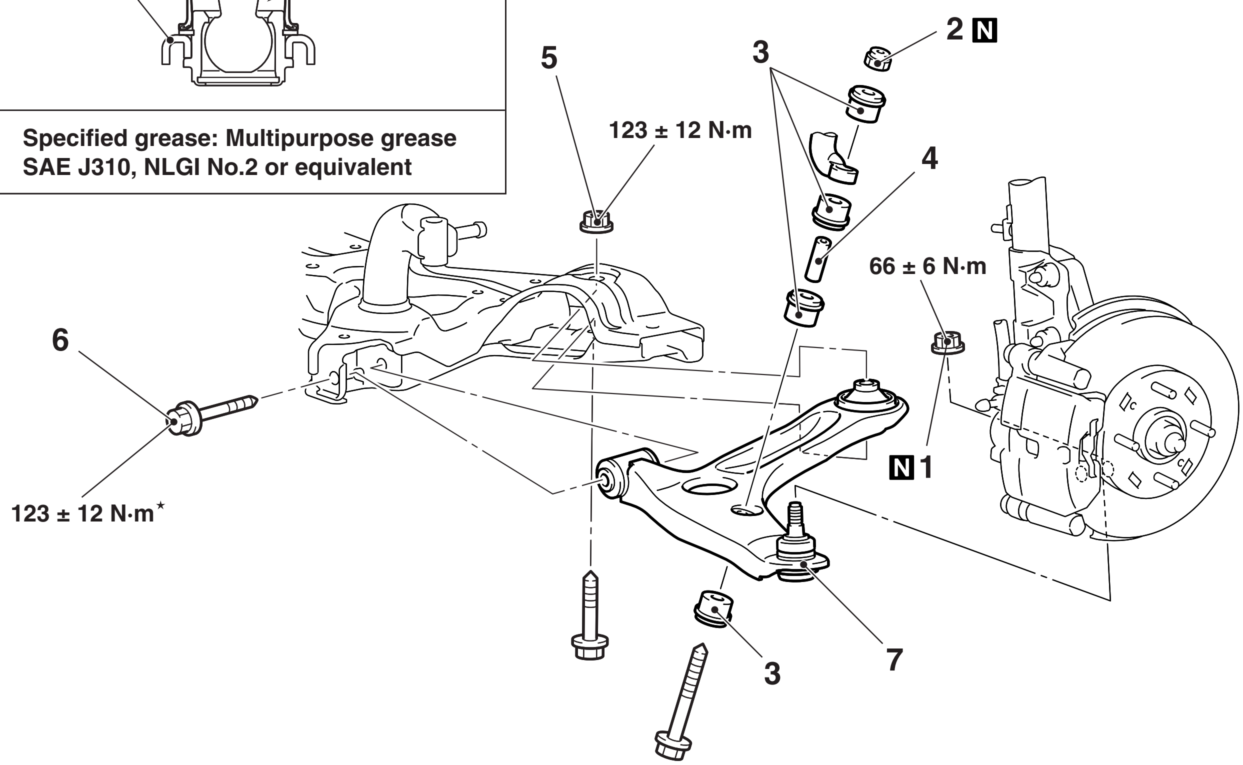
***: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.**

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Front wheel alignment check and adjustment (Refer to P.33-5).



Specified grease: Multipurpose grease SAE J310, NLGI No.2 or equivalent



AC314212AB

Removal steps

<<**A**>> 1. Self-locking nut (Lower arm and knuckle connection)

>>**A**<< 2. Self-locking nut

3. Stabilizer rubber
4. Collar

Removal steps (Continued)

5. Nut (Lower arm and crossmember connection)
6. Bolt (Lower arm and crossmember connection)
7. Lower arm assembly

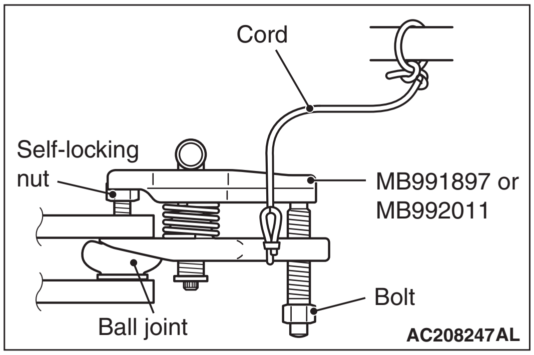
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REMOVAL SERVICE POINT

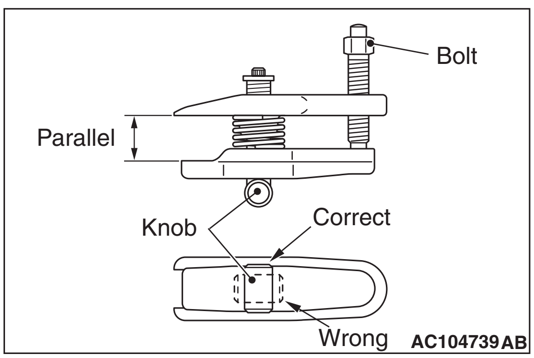
<<A>> SELF-LOCKING NUT REMOVAL (LOWER ARM BALL JOINT DISCONNECTION)

⚠ CAUTION

- **The self-locking nut must be only loosened but not removed from the ball joint. Be sure to use the special tool.**
- **To prevent the special tool from dropping off, suspend it with a cord.**



1. Install the special tool ball joint remover (MB991897 or MB992011) as shown in the figure.



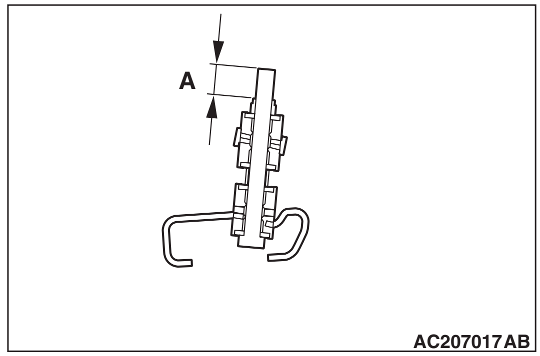
2. Turn the bolt and knob to make the special tool insert horizontal, then hand-tighten the bolt. After tightening, verify that the insert is still horizontal.

   NOTE: . When adjusting the special tool wedge horizontally, position the knob as shown.

3. Turn the bolt to disengage the lower arm ball joint from the knuckle.

INSTALLATION SERVICE POINT

>>A<< SELF-LOCKING NUT INSTALLATION



Tighten the self-locking nut until its protruding length meets the standard value (A).

Standard value (A): 19 ± 1.5 mm

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REMOVAL AND INSTALLATION <4G1>

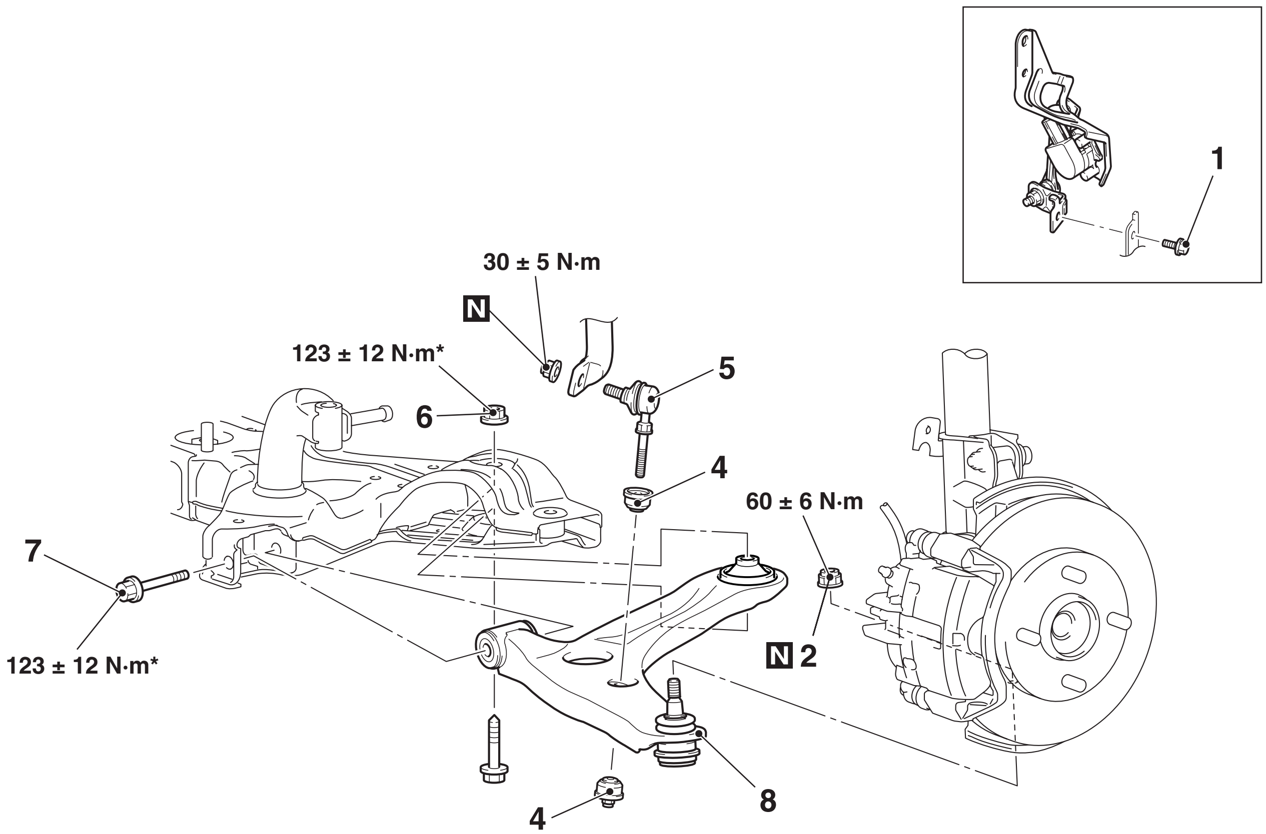
M1332001600922

⚠ CAUTION

***: Indicates parts which should be temporarily tightened, and then fully tightened with the vehicle on the earth in an unladen condition.**

Post-installation Operation

- Check the dust cover for cracks or damage by pushing it with finger.
- Front wheel alignment check and adjustment (Refer to P.33-5).



AC600243 AE

Removal steps

1. Front height sensor and lower arm connection (LH) <Vehicles with headlamp auto levelling system>

<<**A**>> 2. Self-locking nut (Lower arm and knuckle connection)

>>**A**<< 3. Self-locking nut

>>**A**<< 4. Stabilizer rubber

5. Stabilizer link assembly

Removal steps (Continued)

6. Nut (Lower arm and crossmember connection)
7. Bolt (Lower arm and crossmember connection)
8. Lower arm assembly

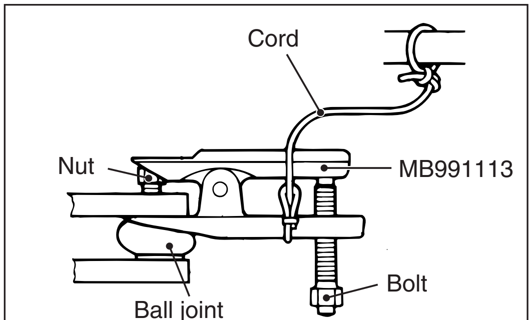
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REMOVAL SERVICE POINT

<<A>> SELF-LOCKING NUT REMOVAL (LOWER ARM BALL JOINT DISCONNECTION)

⚠ CAUTION

- **Do not remove the nut from ball joint. Loosen it and use the special tool to avoid possible damage to ball joint threads.**
- **Hang the special tool with cord to prevent it from falling.**

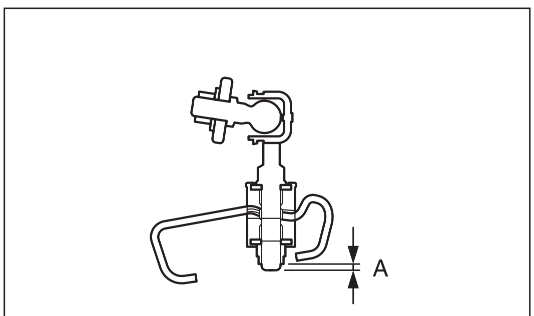


AC102599AC

Replace the self-locking nut with a regular nut, and then install special tool steering linkage puller (MB991113) as shown in the figure.

INSTALLATION SERVICE POINT

>>A<< SELF-LOCKING NUT INSTALLATION



AC402824AB

Install the stabilizer rubber as shown in the figure, and tighten the self-locking nut so that the protrusion of the stabilizer link assembly is within the standard value (A).

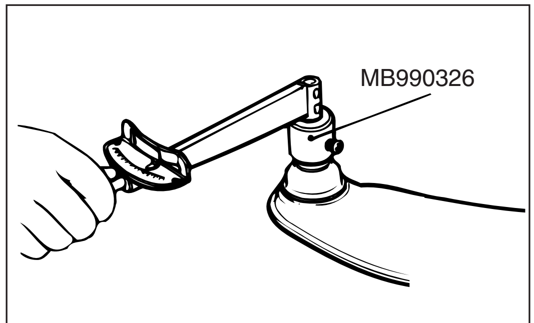
Standard value (A): 5.5 ± 1.5 mm

INSPECTION

M1332001700394

- Check the lower arm bushing for wear and deterioration.
- Check the lower arm assembly for bend or breakage.
- Check all bolts for condition and straightness.

LOWER ARM BALL JOINT STARTING TORQUE CHECK



AC001091 AG

1. After shaking the ball joint stud several times, use special tool preload socket (MB990326) to measure the starting torque of the ball joint.

   Standard value: 0 – 3.9 N·m

2. If the measured value is not within the standard value, or if the ball joint is difficult to turn or does not turn smoothly, replace the lower arm assembly.

LOWER ARM BALL JOINT COVER CHECK

1. Check the lower arm ball joint cover for cracks or damage by pushing it with your finger.
2. If the lower arm ball joint cover is cracked or damaged, replace the lower arm assembly.

   NOTE: Cracks or damage to the dust cover may cause damage to the ball joint. When it is damaged during service work, replace the dust cover.

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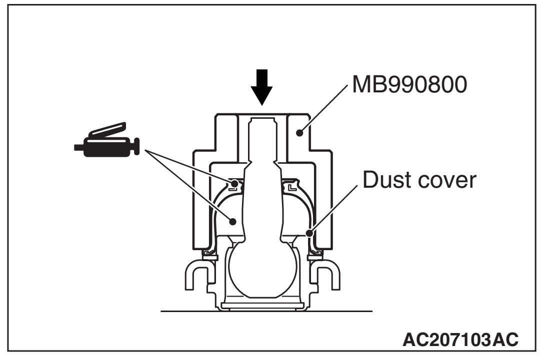
LOWER ARM BALL JOINT COVER REPLACEMENT

M1332008200367

If the lower arm ball joint cover is damaged accidentally during service work, replace the lower arm ball joint cover as follows:

1. Remove the lower arm ball joint cover.
2. Apply specified grease to the lip and the inside of a new lower arm ball joint cover.

   Specified grease: Multipurpose grease SAE J310, NLGI No.2 or equivalent
   Grease amount for the inside of dust cover : 9.0 ± 0.5 g, lip portion of dust cover : 1.0 ± 0.5 g



3. Using special tool ball joint remover and installer (MB990800), drive in the lower arm ball joint cover until it is fully seated.
4. Check the lower arm ball joint cover for cracks or damage by pushing it with your finger.

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STABILIZER BAR

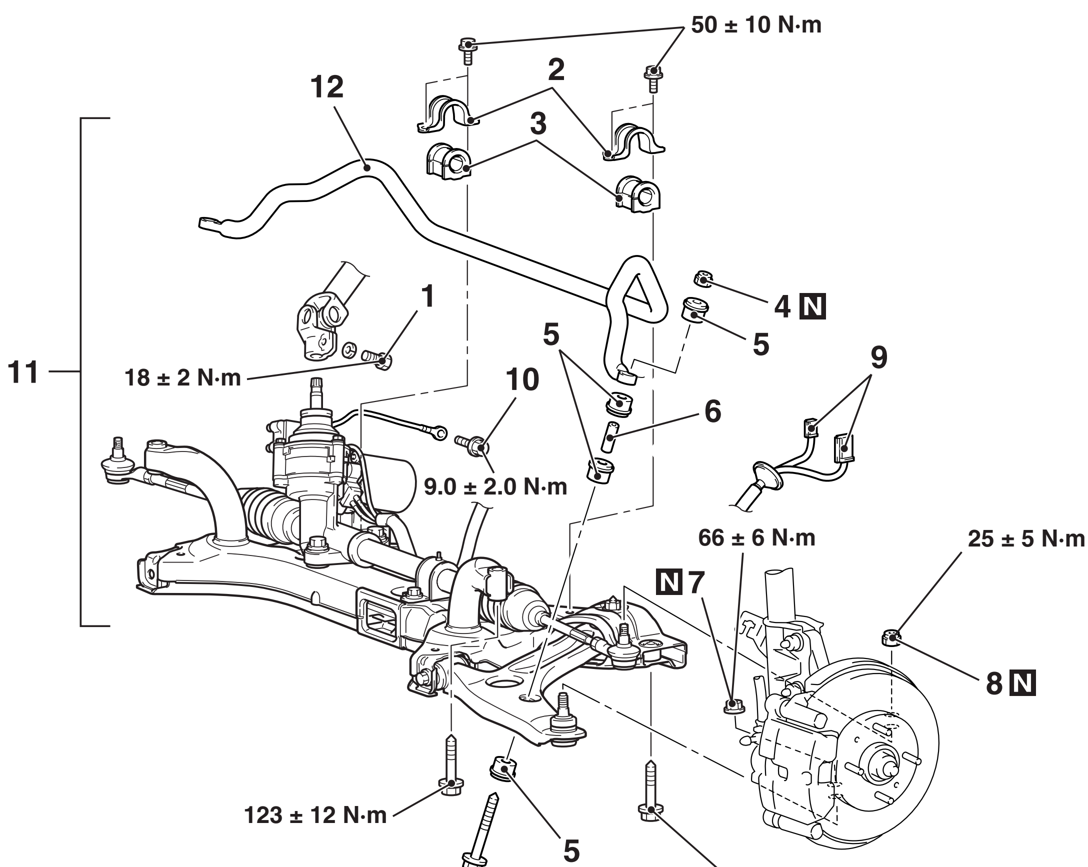
REMOVAL AND INSTALLATION <4A9>

M1332004000769

⚠ CAUTION

Before removing the steering wheel and air bag module assembly, refer to GROUP 52B, Service Precautions P.52B-5 and Air Bag Module and Clock Spring P.52B-145. Also, put the front wheels in straight-ahead position. Failure to do so may damage the SRS clock spring and render the SRS air bag inoperative, which results serious driver injury.

Pre-removal Operation	Post-installation Operation
• Air bag module and steering wheel (Refer to GROUP 52B, Driver's, front passenger's air bag module(s) and clock spring P.52B-145). • Engine room centre under cover • Engine room side under cover (RH) • Front exhaust pipe (Refer to GROUP 15, Exhaust pipe and main muffler P.15-19). • Engine roll stopper rod assembly (Refer to GROUP 32, Engine roll stopper rod P.32-11).	• Engine roll stopper rod assembly (Refer to GROUP 32, Engine roll stopper rod P.32-11). • Front exhaust pipe (Refer to GROUP 15, Exhaust pipe and main muffler P.15-19). • Engine room side under cover (RH) • Engine room centre under cover • Air bag module and steering wheel (Refer to GROUP 52B, Driver's, front passenger's air bag module(s) and clock spring P.52B-145). • Checking steering wheel position with wheels straight ahead • Front wheel alignment check and adjustment (Refer to P.33-5).



AC405504 AB

Removal steps

<<**A**>>	>>**E**<<	1.	Bolt (Steering gear and steering column assembly connection)
	>>**A**<<	2.	Stabilizer bar bracket
	>>**A**<<	3.	Stabilizer bushing
	>>**D**<<	4.	Self-locking nut
	>>**D**<<	5.	Stabilizer rubber

Removal steps (Continued)

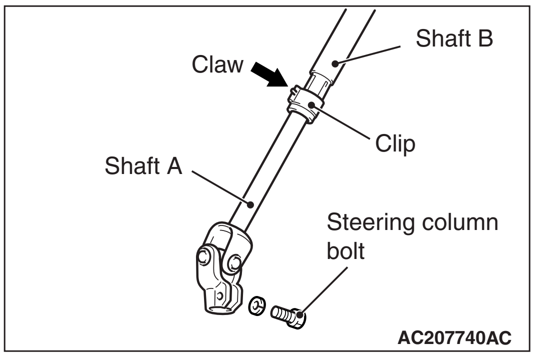
	>>**D**<<	6.	Collar
<<**B**>>		7.	Self-locking nut (Lower arm ball joint and knuckle connection)
<<**B**>>		8.	Self-locking nut (Tie rod end and knuckle connection)

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			Removal steps (Continued)
	>>C<<	9.	Steering gear connector (in-vehicle Electric power steering-ECU side)
	>>B<<	10.	Steering gear bolt (earth bolt)
<<C>>		11.	Front axle No.1 crossmember assembly
	>>A<<	12.	Stabilizer bar

REMOVAL SERVICE POINTS

<<A>> BOLT (STEERING GEAR AND STEERING COLUMN ASSEMBLY CONNECTION) REMOVAL

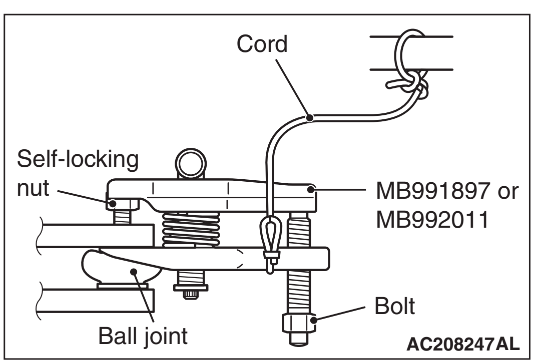


1. Remove the steering column bolt securing the steering gear to the steering column assembly.
2. Disconnect the steering gear from the steering column assembly while sliding shaft A to shaft B with the clip claw as shown is pinched.

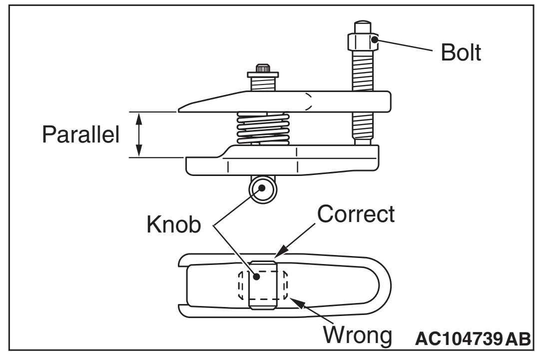
<<B>>SELF-LOCKING NUT (TIE ROD END AND KNUCKLE CONNECTION)/SELF-LOCKING NUT (LOWER ARM BALL JOINT AND KNUCKLE CONNECTION) REMOVAL

⚠ CAUTION

- **The self-locking nut must be only loosened but not removed from the ball joint. Be sure to use the special tool.**
- **To prevent the special tool from dropping off, suspend it with a cord.**



1. Install the special tool ball joint remover (MB991897 or MB992011) as shown in the figure.

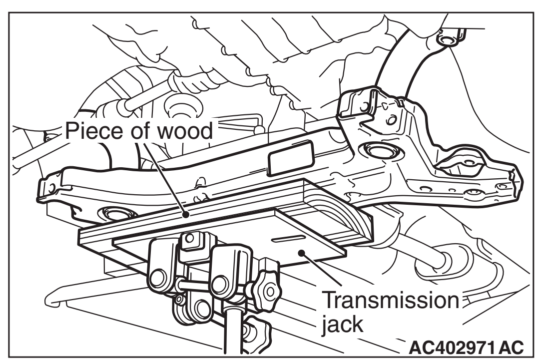


2. Turn the bolt and knob to make the special tool insert horizontal, then hand-tighten the bolt. After tightening, verify that the insert is still horizontal.

   NOTE: When adjusting the special tool wedge horizontally, position the knob as shown.
3. Turn the bolt to disengage the lower arm ball joint from the knuckle.

<<C>> FRONT AXLE NO.1 CROSSMEMBER ASSEMBLY REMOVAL

Carry out the works below to gain the clearance required to remove the stabilizer bar.

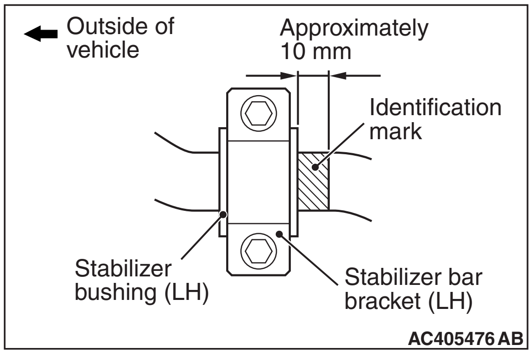


1. Jack up and support the front axle No.1 crossmember assembly with a transmission jack, and remove the mounting bolts.
2. Lower the front axle No.1 crossmember until the stabilizer bar can be removed.

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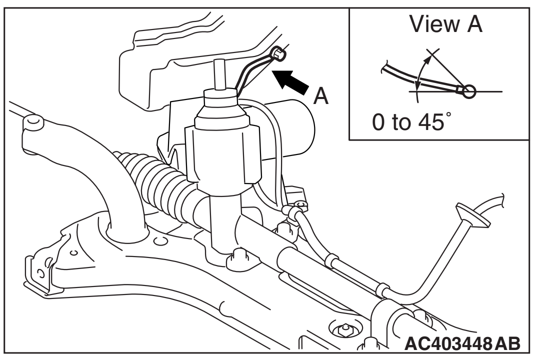
INSTALLATION SERVICE POINTS

>>A<< STABILIZER BAR/STABILIZER BUSHING/STABILIZER BAR BRACKET INSTALLATION



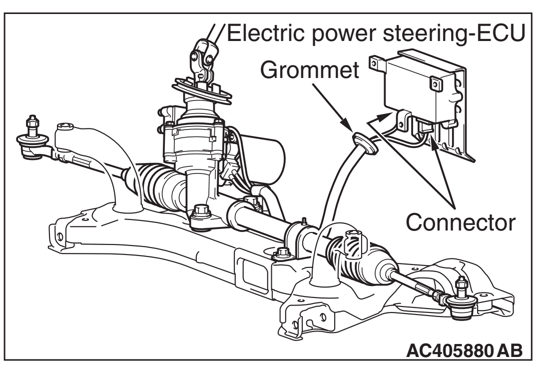
Align the stabilizer bar identification mark with the right end of the stabilizer bushing (LH).

>>B<< STEERING GEAR BOLT (EARTH BOLT) INSTALLATION



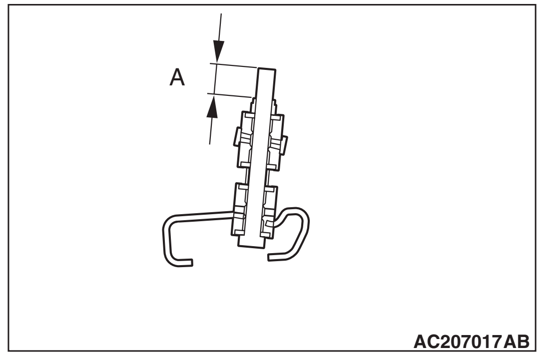
Tighten the steering gear bolt so that the installation angle of the earth cable is within the area shown in the figure.

>>C<< STEERING GEAR CONNECTOR (IN-VEHICLE EPS-ECU SIDE) INSTALLATION



Firmly secure the grommet to the body panel and connect the connector to the Electric power steering-ECU.

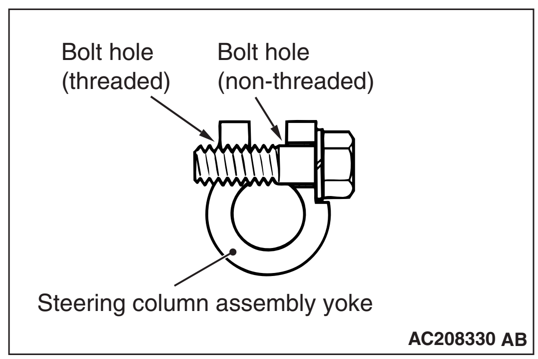
>>D<< COLLAR/STABILIZER RUBBER/SELF-LOCKING NUT INSTALLATION



Tighten the self-locking nut until its protruding length meets the standard value (A).

Standard value (A): 19 ± 1.5 mm

>>E<< BOLT (STEERING GEAR AND STEERING COLUMN ASSEMBLY CONNECTION) INSTALLATION



Insert the bolt connecting the steering column assembly with the steering gear into the non-threaded bolt hole.

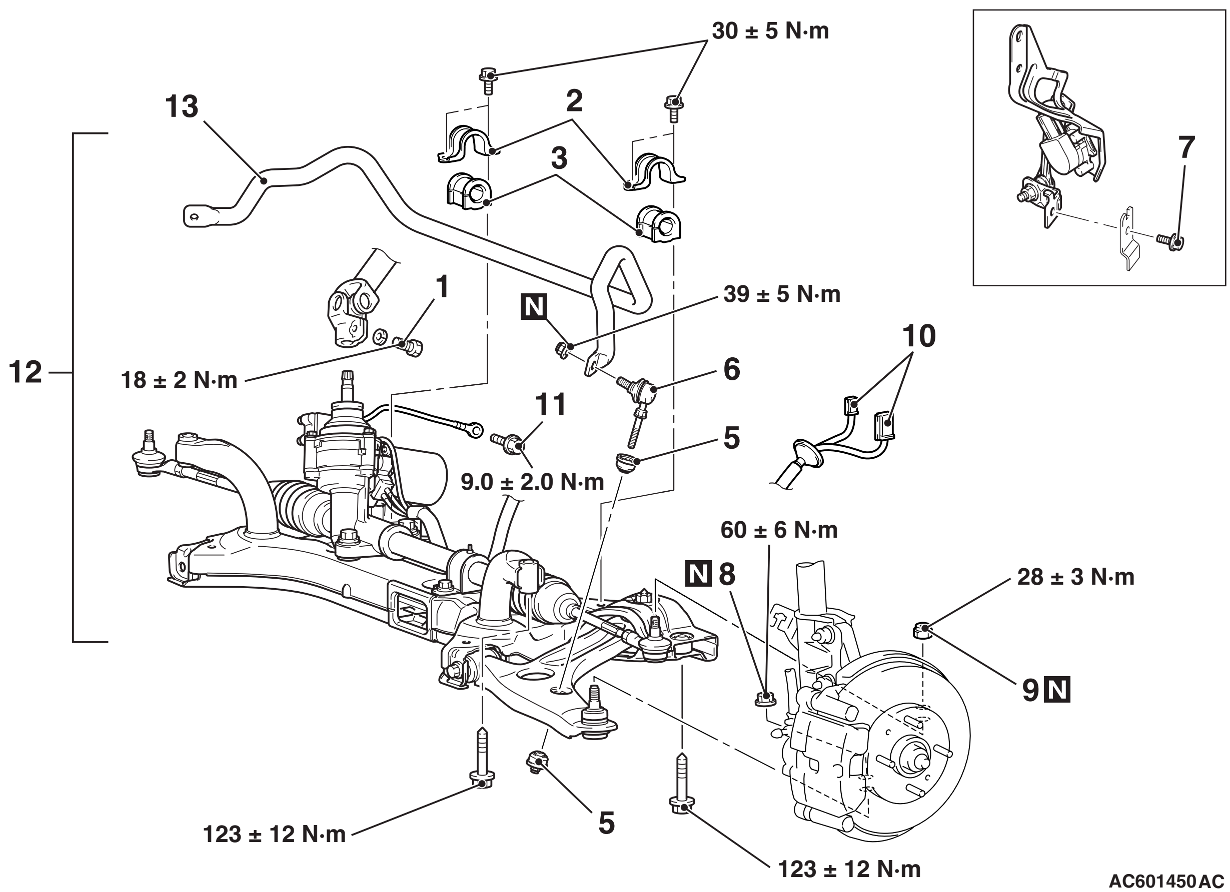
REMOVAL AND INSTALLATION <4G1>

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⚠ CAUTION

Before removing the steering wheel and air bag module assembly, refer to GROUP 52B, Service Precautions P.52B-5 and Air Bag Module and Clock Spring P.52B-145. Also, put the front wheels in straight-ahead position. Failure to do so may damage the SRS clock spring and render the SRS air bag inoperative, which results serious driver injury.

Pre-removal Operation	Post-installation Operation
• Air bag module and steering wheel (Refer to GROUP 52B, Driver's, front passenger's air bag module(s) and clock spring P.52B-145). • Engine room centre under cover • Engine room side under cover (RH) • Front exhaust pipe (Refer to GROUP 15, Exhaust pipe and main muffler P.15-21). • Engine roll stopper rod assembly (Refer to GROUP 32, Engine roll stopper rod P.32-11).	• Engine roll stopper rod assembly (Refer to GROUP 32, Engine roll stopper rod P.32-11). • Front exhaust pipe (Refer to GROUP 15, Exhaust pipe and main muffler P.15-21). • Engine room side under cover (RH) • Engine room centre under cover • Air bag module and steering wheel (Refer to GROUP 52B, Driver's, front passenger's air bag module(s) and clock spring P.52B-145). • Checking steering wheel position with wheels straight ahead • Front wheel alignment check and adjustment (Refer to P.33-5).



Removal steps

<<A>> >>E<< 1. Bolt (Steering gear and steering column assembly connection)

>>A<< 2. Stabilizer bar bracket

>>A<< 3. Stabilizer bushing

>>D<< 4. Self-locking nut

>>D<< 5. Stabilizer rubber

>>D<< 6. Stabilizer link assembly

Removal steps (Continued)

7. Front height sensor and lower arm connection (LH) <Vehicles with headlamp auto levelling system>

<<B>> 8. Self-locking nut (lower arm and knuckle connection)

<<B>> 9. Self-locking nut (Tie rod end and knuckle connection)

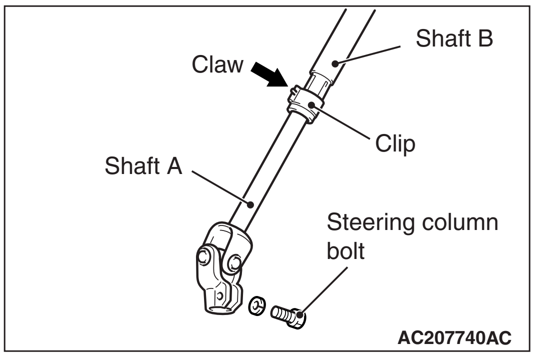
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Removal steps (Continued)

	>>**C**<<	10.	Steering gear connector (in-vehicle Electric power steering-ECU)
	>>**B**<<	11.	Steering gear bolt (earth bolt)
<<**C**>>		12.	Front axle No.1 crossmember assembly
	>>**A**<<	13.	Stabilizer bar

REMOVAL SERVICE POINTS

<<A>> BOLT (STEERING GEAR AND STEERING COLUMN ASSEMBLY CONNECTION) REMOVAL

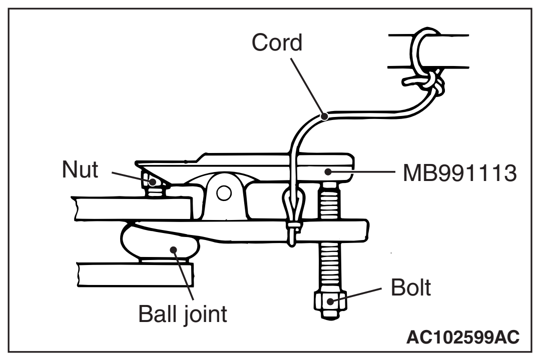


1. Remove the steering column bolt securing the steering gear to the steering column assembly.
2. Disconnect the steering gear from the steering column assembly while sliding shaft A to shaft B with the clip claw as shown is pinched.

<<B>>SELF-LOCKING NUT (TIE ROD END AND KNUCKLE CONNECTION)/SELF-LOCKING NUT (LOWER ARM BALL JOINT AND KNUCKLE CONNECTION) REMOVAL

⚠ CAUTION

- **Do not remove the nut from ball joint. Loosen it and use the special tool to avoid possible damage to ball joint threads.**
- **Hang the special tool with cord to prevent it from falling.**

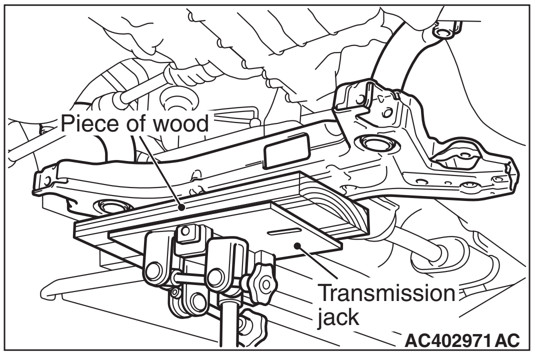


Replace the self-locking nut with a regular nut, and then install special tool steering linkage puller (MB991113) as shown in the figure.

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<<C>> FRONT AXLE NO.1 CROSSMEMBER REMOVAL

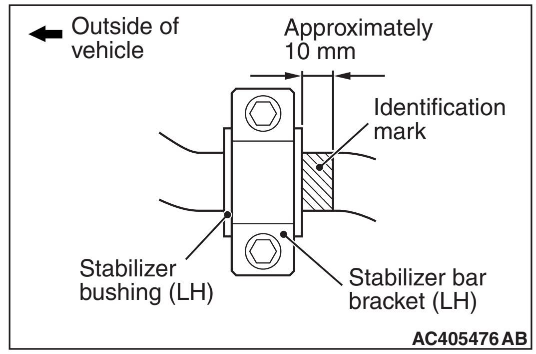
Carry out the works below to gain the clearance required to remove the stabilizer bar.



1. Jack up and support the front axle No.1 crossmember assembly with a transmission jack, and remove the mounting bolts.
2. Lower the front axle No.1 crossmember until the stabilizer bar can be removed.

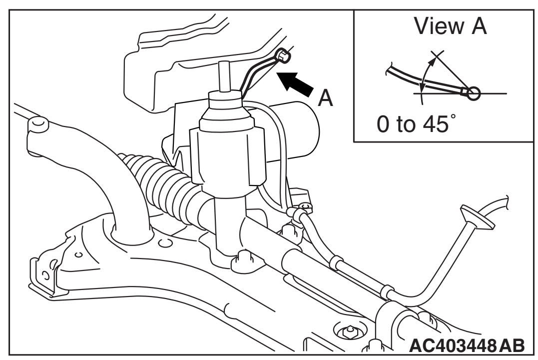
INSTALLATION SERVICE POINTS

>>A<< STABILIZER BAR/STABILIZER BUSHING/STABILIZER BAR BRACKET INSTALLATION



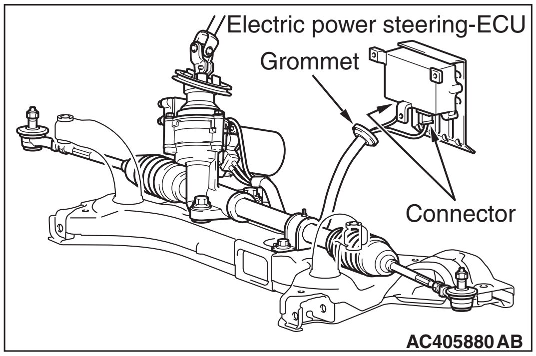
Align the stabilizer bar identification mark with the right end of the stabilizer bushing (LH).

>>B<< STEERING GEAR BOLT (EARTH BOLT) INSTALLATION



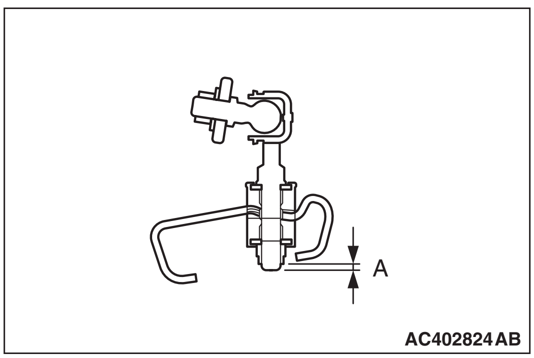
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>>C<< STEERING GEAR CONNECTOR (IN-VEHICLE EPS-ECU) INSTALLATION



Firmly secure the grommet to the body panel and connect the connector to the Electric power steering-ECU.

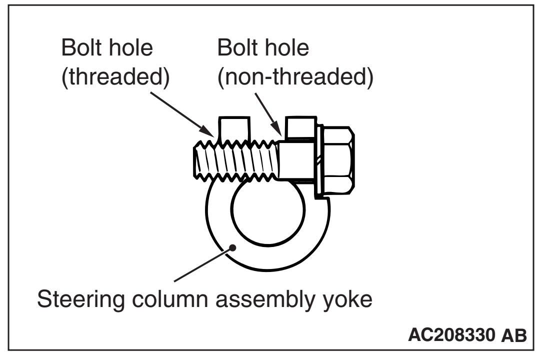
>>D<< STABILIZER LINK ASSY/STABILIZER RUBBER/SELF-LOCKING NUT INSTALLATION



Install the stabilizer rubber as shown in the figure, and tighten the self-locking nut so that the protrusion of the stabilizer link assembly is within the standard value (A).

Standard value (A): 5.5 ± 1.5 mm

>>E<< BOLT (STEERING GEAR AND STEERING COLUMN ASSEMBLY CONNECTION) INSTALLATION



Insert the bolt connecting the steering column assembly with the steering gear into the non-threaded bolt hole.

INSPECTION

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- Check the stabilizer rubbers and stabilizer bushings for wear and deterioration.
- Check the stabilizer bar for deterioration or damage.
- Check all bolts for condition and straightness.